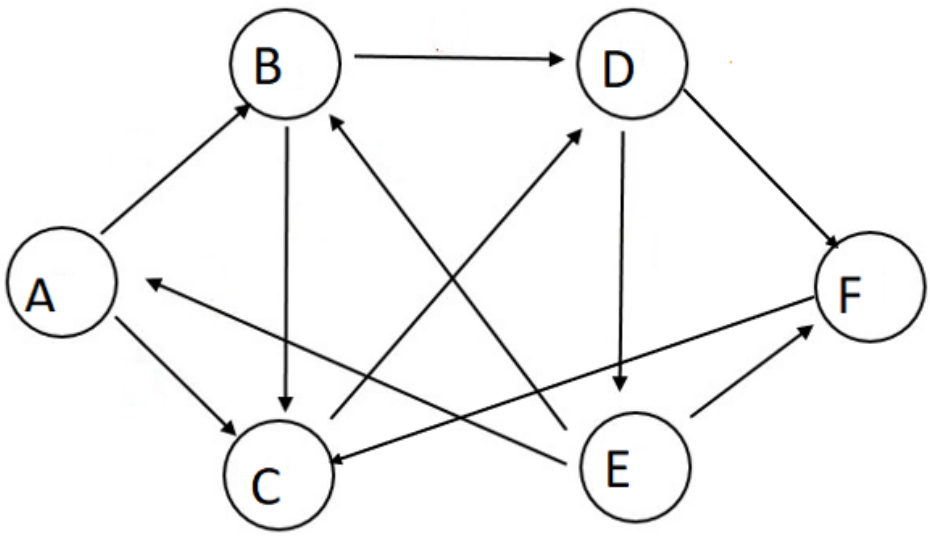
EAST WEST UNIVERSITY
Department of Computer Science and Engineering
B.Sc. in Computer Science and Engineering Program
Final, Sprig 2021

Course: **CSE246 (Algorithms), Section - 1**
Instructor: **Taskeed Jabid**
Full Marks: **25**
Time: **1 Hour and 15 Minutes**

Note: There are FIVE questions, answer ALL of them.
In some question, you need to choose some input data. I expect that no input data set will be same with any other script.

Question#1
Draw a graph for which the minimum spanning tree is same if you applied any of Prim's or Kruskal's algorithm. Also draw another graph for which the minimum spanning tree is different for Prim's and Kruskal's algorithm. [In both cases, graph should have at least 6 vertices and 11 edges]. Briefly explain the process of finding MST with Prim's (if your ID is odd) or Kruskal's (if your ID is even) using your second graph.

Question#2
Assign weight of the edges of the following graph from the set of integers ranging from 1 to 25. Run the Dijkstra shortest path algorithm on the following graph, starting from vertex A. Specifically, fill in the following table below according the steps of the algorithm. [If your ID is odd then choose all weight as odd number, and vice versa]



Iteration/Vertex	A	B	C	D	E	F
0	0/NIL	Infinity/NIL	Infinity/NIL	Infinity/NIL	Infinity/NIL	Infinity/NIL
1						
2						
3						
4						
5						

6						

Question#3

Suppose in a weighted graph weight of all edges are same. Only one edge is negative value with that same weight. As example, if weight of one edge is 10 then all edges weight is 10 and only one edge weight is -10. In this specific graph if you want to find shortest path to all nodes from a specific source, which shortest path algorithm need to applied. Write down your mentioned algorithm.

If some modification ensures better performance, then write down the modified algorithms.

Question#4

Apply Graham Scan algorithm on the following 10 points. A(10, 4), B(5,9), C(7, 7), D(3, 7), E(9,5). Choose your own value for rest of the five points i.e., F-J. Write down the list of points which will be dropped from the polygon in order of the actual discard happened according to the algorithm. [For clarity of your answer label the points from P_0 to P_9 according to the algorithm]

Question#5

Goopy and Bagha resides in a same building. However, recently they quarrel with each other and rivalry become so intense that each one refuses to walk on any road that the other has stepped on in any particular day. Now the king calls them to the palace for dinner. So they have to go the palace. So, they decided that they have no problem with their paths crossing at a corner and/or crossing as long as the same road are not used by both of them. Fortunately, both the Goopy/Bagha's house and the King's palace are on corners. Now Goopy/Bagha is not sure if it is going to be possible to reach the king's palace without using the same road. Show how to formulate the problem's solution and of determining whether they can reach the king's palace as a maximum-flow problem.